Exam: Function Reflections (Solution version 2)

1. Let function f be defined by the polynomial below:

$$f(x) \;=\; -8x^4 + 7x^3 - 9x^2 - 2x + 6$$

Draw lines that match each function reflection with its polynomial:

Reflections	Polynomials

$-f(-x)$

$f(-x)$

$-f(x)$

$8x^4 - 7x^3 + 9x^2 + 2x - 6$

$8x^4 + 7x^3 + 9x^2 - 2x - 6$

$-8x^4 - 7x^3 - 9x^2 + 2x + 6$

2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.

- $y = g(x)$
- $y = g(-x)$

- $y = h(x)$
- $y = -h(x)$

- $y = m(x)$
- $y = m^{-1}(x)$

- $y = p(x)$
- $y = -p(-x)$
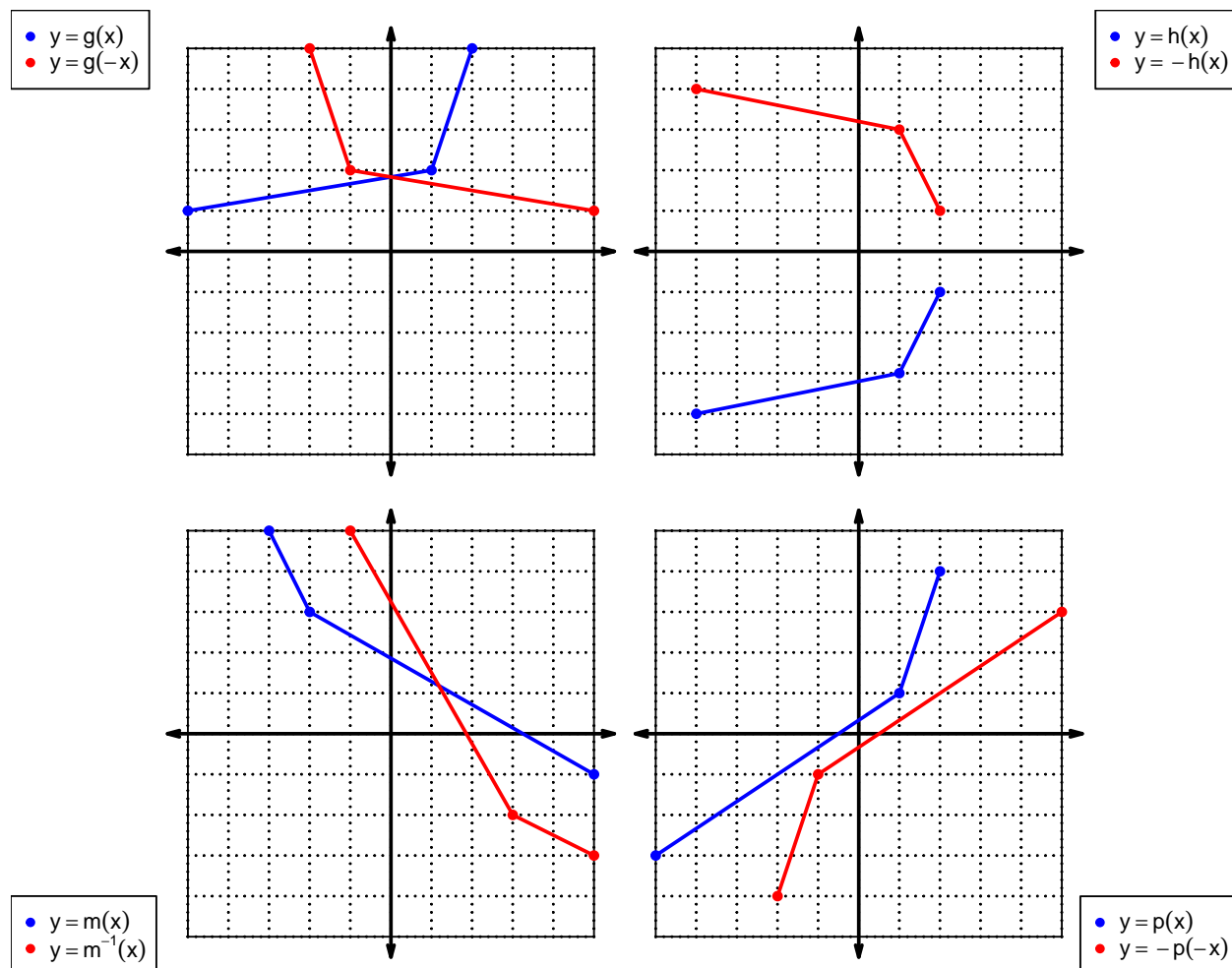
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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	2	5	7
2	7	8	3
3	4	6	8
4	9	2	2
5	3	7	1
6	5	9	9
7	6	3	4
8	1	4	6
9	8	1	5

3. Evaluate $f(5)$.

$$f(5) = 3$$

4. Evaluate $g^{-1}(4)$.

$$g^{-1}(4) = 8$$

5. By filling more rows of the table, it is possible to make function f **even**. If that were done, what would be the value of $f(-1)$?

If function f is even, then
$$f(-1) = 2$$

6. By filling more rows of the table, it is possible to make function h **odd**. If that were done, what would be the value of $h(-6)$?

If function h is odd, then
$$h(-6) = -9$$

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7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.

Let polynomial p be defined with the following equation:

$$p(x) = x^2 - 1$$

a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = (-x)^2 - 1$$
$$p(-x) = x^2 - 1$$

b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -\left(x^2 - 1\right)$$
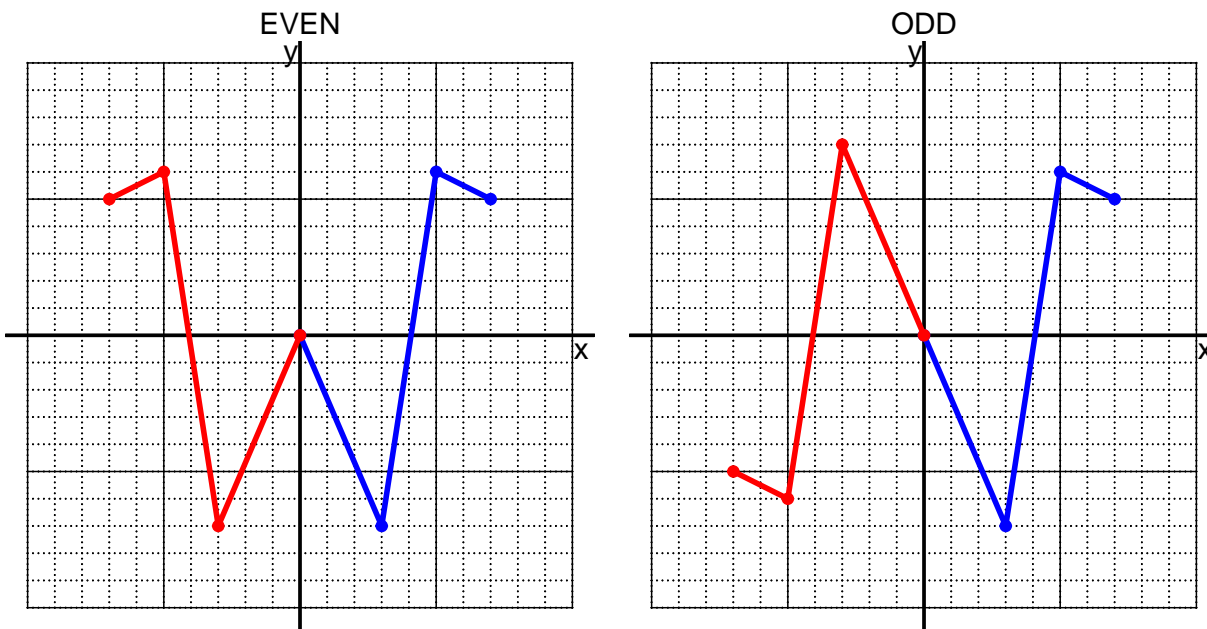$$-p(-x) = -x^2 + 1$$

c. Is polynomial p even, odd, or neither?

even

d. Explain how you know the answer to part c.

We see that $p(x) = p(-x)$ for all x because $p(x)$ and $p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an even function.

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8. I have drawn half of a function. Draw the other half to make it even or odd.

EVEN

ODD

9. Let function f be defined with the equation below.

$$f(x) = \frac{x+5}{2}$$

   a. Evaluate $f(41)$.

     step 1: add 5
     step 2: divide by 2

$$f(41) = \frac{(41)+5}{2}$$
$$f(41) = 23$$
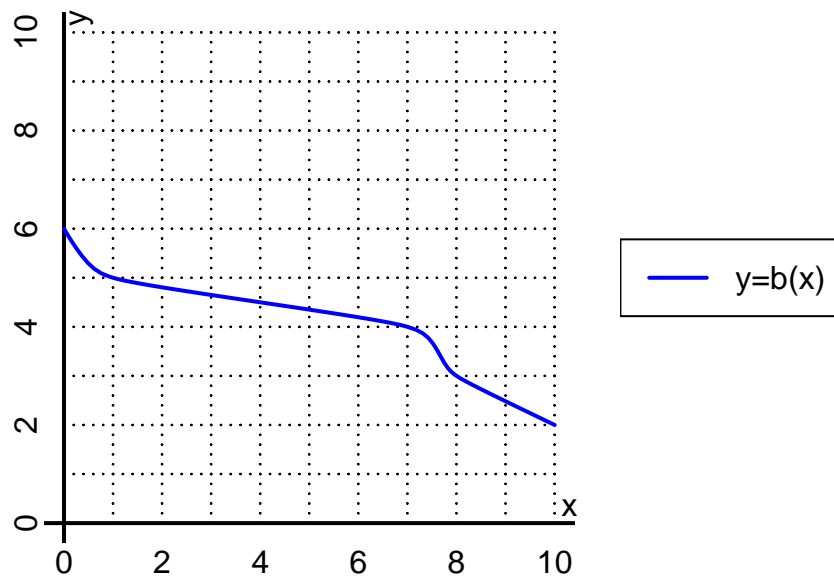
   b. Evaluate $f^{-1}(24)$.

     step 1: multiply by 2
     step 2: subtract 5

$$f^{-1}(x) = 2x - 5$$
$$f^{-1}(24) = 2(24) - 5$$
$$f^{-1}(24) = 43$$

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10. The function b is represented by the curve $y = b(x)$ graphed below.

a. Evaluate $b(8)$.

$$b(8) \;=\; 3$$

b. Evaluate $b^{-1}(5)$.

$$b^{-1}(5) \;=\; 1$$

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11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-5	5	5	-5
-1	6	-6	-6	6
0	0	0	0	0
1	-6	6	6	-6
2	5	-5	-5	5

b. Is function f even, odd, or neither?

odd

c. How do you know the answer to part b?

Function f is odd because column $-f(-x)$ matches column $f(x)$ exactly.